DOCKET FILE COPY ORIGINAL

RECEIVED
JUN 6 1994
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands	)	CC Docket No. 92-166

REPLY COMMENTS OF THE FEDERAL AVIATION ADMINISTRATION ON THE NOTICE OF PROPOSED RULEMAKING

The FAA supports the licensing of MESs and GESs by the FCC[1].

The 20 msec MSS signal level[3] averaging time has no meaning with respect to GPS or GLONASS operational time constants or exposure time.

The ultimate protection band for GLONASS is 1598-1610 MHz. This band encompasses the planned future GLONASS antipodal operation and a potential downward shift in frequency of up to 6 channels.

The FAA agrees with the proposed -70 dB(W/MHz) MSS EIRP limit in the GPS and GLONASS protection bands. Link budget analysis presented in our previous filing is consistent with that number. As mentioned in that filing, it does not cover one particularly important scenario; that of an aircraft on final approach passing over an MSS terminal at ground level under the approach path. Work on that requirement is underway. The LQP proposal to increase this limit to -50 dB(W/MHz) is without technical merit. In fact, the LQP basis is best summed up in a statement in their comment to this proceeding, "... is a reasonable unwanted emission limit for the development of reasonably priced MES units for use with MSS systems and will adequately protect the GPS system from out-of-band emissions from such systems." This is not the basis on which one determines the protection criteria for aeronautical radio-navigation systems and must be rejected by the Commission, as it has by the FAA.

LQP has included in its filing an analysis by a contractor Sat-Tech on the use of GLONASS. This current filing is not the forum for a detailed critique of their work. However, a leading expert on aeronautical radio-navigation and inventor of the

No. of Copies rec'd 0+4
List ABCDE

required navigation performance (RNP) concept, has reviewed for the FAA the LQP filing, in particular the Sat-Tech work. His review produced no new information for the FAA on the use of GLONASS. However, inconsistencies were uncovered. Several were noted in Exhibit 3-1 Globalstar MES GPS Interference Assessment. They are detailed below:

1. The EIRP used was -30.5 dBm (-60.5 dBW), 10 dB below the Globalstar proposed limit of -50 dB(W/MHz).

2. No margin was included for multiple emitters or unknown factors. The FAA proposed 8 dB.

3. The desired GPS signal level was incorrectly stated as -130 dBm at the GPS receiver antenna port, when in fact that specification is at a presumed isotropic antenna. This overestimates the margin by 6 dB.

4. A 18 dB C/I was used. The text implies that this contains an implied margin of 6 dB when compared to a 24 dB C/I. In fact, the correct C/I is 21 dB, cutting this margin in half.

When the above are taken into consideration, the 6.1 dB margin becomes:

+6.1	dB	Exhibit 3.1 "margin"
-8	dB	multiple sources and unknown factors
-6	dB	error in desired signal level at receiver
-10	dB	EIRP compared to LQP proposal
-3	dB	error in C/I (21 dB not 24 dB)
-21.1	dB	ACTUAL MARGIN.

A similar analysis applied to Exhibit 3-4 of the LQP Sat-Tech analysis results in similar conclusions regarding "actual margin". The -21 dB applied to the LQP proposed -50 dB(W/MHz), results in the original FAA limit of -70 dBW, within a decibel.

Signal detection and processing techniques are continuing to evolve and improve. In order for the aeronautical community to have freedom to continue its research, it must not be constrained by the specter of interference from out-of-band systems which themselves are not yet off the drawing board. Recent developments in the field of signal detection indicate that up to +/- 15 MHz about the GPS center frequency may need to be protected. This development has come about since our May 5 filing. In that filing, we indicated that a +/- 10 MHz protection bandwidth might be sufficient. This requirement could change again as the community begins to solidify GPS and DGPS designs.

The power density limit, specified in RR 731F, -15 dB(W/4kHz), is far too high to protect inband GLONASS for anything but, possibly, some high altitude enroute navigation scenarios in Russia, notwithstanding comments by Constellation to the contrary. The text proposed by the Commission for section 25.213(c)(1) reflecting the required protection for this safety service is not only appropriate but required in order to be in compliance with international radio regulations. It would apply to any aeronautical radio-navigation system in that band. Ignoring the protection needs of an existing safety system, as proposed by Constellation, is not an acceptable way of solving a sharing problem. In the same vain, we support the text of section 25.143(b)(2)(iv) as proposed by the Commission.

The FAA disagrees with Constellation, and agrees with the Commission on section 25.213(c)(2). This provision is an essential protection for avionics systems from interference from "Big LEO" transmissions in the 1.6 GHz band. Recent attempts to certify GPS on aircraft have indicated that extreme care by industry must be taken in order to protect it from on-board transmissions in the 1.6 GHz band. It is clear that such transmissions from "Big LEO" MESs on-board would present a serious interference threat to both GPS and GLONASS. Such transmissions must clearly be prohibited by Federal regulation.

The FAA plans for 5000-5250 MHz band have not lessened since the NRM, and we maintain our opposition to the use of this band for MSS feeder links. Both Constellation and LQP have made pleadings for the Commission to abandon its position not to consider this band for "Big LEO" feeder links. Both have indicated a lack of assurance of how the FAA will use this band. The aeronautical community develops new systems and capabilities only after an exhaustive study of needs, cost-benefits, and alternatives, with safety as a prime consideration. Its plans are not for its own benefit but for the flying public, both domestic and international. Since it is, by its very nature, international in scope, lengthy coordination is needed. It cannot act capriciously nor can it bind itself to the timetable of some other community which may be in a hurry to promote its own interests. Neither Constellation nor LQP is in any position to make demands on the aeronautical community with respect to how it uses spectrum which is and has been allocated for its use. We submit that the Commission maintain its position that other bands be used for feeder links for the "Big LEO" systems.

The FAA supports the need for a transition plan[2] in order to protect GLONASS until the Russian Federation can, in fact, accomplish the shift to full antipodal operation. The FAA supports the shift to antipodal operation. However, it is likely to take some years to accomplish. It is during this time that a transition plan must provide protection for all GLONASS operations. This protection may require protection up to

1616 MHz during the transition. Contrary to the speculations by Motorola in their filing, the plans for the ICAO GNSS clearly include GLONASS. The FAA has committed itself to the implementation of satellite based navigation for the next century, and, as such, is planning to implement GNSS domestically and to foster its implementation internationally. It should be obvious that the GNSS is still in its infancy. The United States is moving ahead briskly with the development of its own entry, GPS. The requirements for aviation use in all of its various scenarios is now ongoing. The FAA is focused on getting its own entry operational. The Motorola reference to the comments of an FAA official underline this fact. Those comments did not infer that GLONASS is not part of the future United States GNSS. It is clear that GPS will require augmentation to meet the RNP for precision landing. The exact form of that augmentation will most likely be different for each category of service. GLONASS is a prime candidate for this augmentation, and is actively being studied as to how it will best fit into the overall GNSS as implemented domestically, and internationally.

Motorola's speculations on FAA plans for the future and how the Russian Federation will react to a transition plan are clearly without substance. A transition plan is, in fact, in the best interests of an expeditious implementation and operation of the "Big LEO" systems.

With respect to LQP pleading that it should be allowed to interfere with one GLONASS frequency, because such interference would still leave so many other satellites to navigate by is absurd. First of all, LQP has not demonstrated such a surgical interference mechanism. Second, it is presumptuous to expect that a safety of life aeronautical navigation system should have to take into account potential interference from an out of band communication satellite system. Third, LQP has not submitted any factual evidence to back up their claim.

---

(1) NPRM, paragraph 88.
(2) NPRM in footnote 59.
(3) NPRM, Appendix A, paragraph 15(b)

Gerald J. Markey

Gerald G. Markey
Director, Office of Spectrum Policy
and Management